Space Weather Forecast

Issued on Sunday, 17 July 2022 at 13:07 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate X-ray flares likely at first, risk reducing later. Chance of Minor Geomagnetic Storms Days 3-4 (19-20 July) with CME arrival.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the last 24 hours, with a Moderate-class flare from the SW quadrant at 16/1539UTC. There are currently eight active regions on the solar disc at present, with the most complex being a region in the northwest which contains some magnetic complexity in one of its spots. There was little change in most sunspot regions in this period, although a region in the NW produced a long period Common-class flare, which suggests it may be more complex than we can see due to the viewing angle near the limb.
A large filament (arc of plasma) lifted off from the northwestern quadrant and largely erupted heading north and west of the Sun-Earth line between 13/1300 and 1600UTC. This was clearly visible as a partial halo in satellite imagery. The most likely arrival time for this feature is either late on 19 July or early on 20 July. Another large filament that lifted from the southwest quadrant later in the day of 16 July is unlikely to have a significant Earth-directed component, although modelling is still ongoing. No other Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: The solar wind has been slightly elevated over the past 24 hours, likely from a waning coronal hole fast wind. The speed was mostly slightly elevated, mainly varying between 370-500 km/s. The Interplanetary Magnetic Field was weak, with the north-south component varying weakly. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is Likely to be Moderate, with a daily slight chance of Strong-class flares. Two of the current large sunspots should leave the Earth-facing side of the Sun into the new week, resulting in a slight reduction in flare probability. Arriving bright flux over the eastern solar horizon may signify arriving sunspots which could compensate for any loss.

Solar Wind / Geomagnetic Activity: The 15/1300UTC CME is due to impact Earth either late on 19 July or early on 20 July. Slightly elevated solar wind speeds should continue to decline through Day 1 (17 July). Some minor influence from a coronal hole is expected on day three (Tuesday 19 July), but it is expected to be a minor player given the CME due around the same time.
Geomagnetic activity is likely to remain at Quiet levels through Days 1 and 2, but becoming Unsettled to Active (probably protracted) with a Chance of G1/Minor Storms on 19 July from the combined effect of the CME mentioned above, and any coronal hole influence. The slow speed of the assessed CME may result in the risk of G1 extending through midweek UTC before easing.

Energetic Particles / Solar Radiation: There remains a daily slight chance of S1 or greater solar radiation storms due to the presence of large sunspot regions in the better-connecting (with Earth) central and western portions of the Sun.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	40	40
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	50	40	40
Very Active	R3 to R5 X	No	10	10	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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